

November 2001

IRF634B/IRFS634B

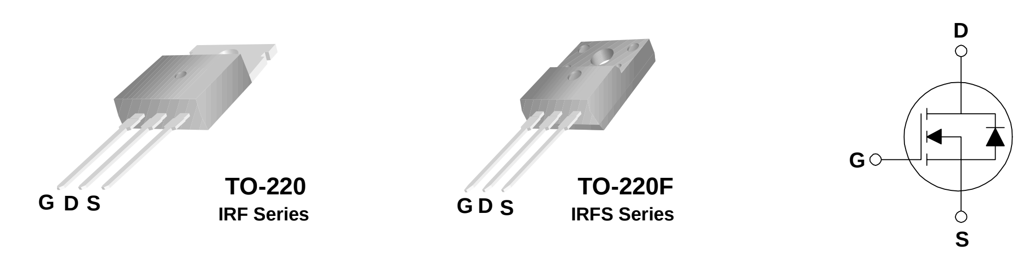
250V N-Channel MOSFET

General Description

These N-Channel enhancement mode power field effect transistors are produced using Fairchild's proprietary, planar, DMOS technology.
This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switching DC/DC converters and switch mode power supplies.

Features

- 8.1A, 250V, $R_{DS(on)}$ = 0.45Ω @V_{GS} = 10 V
- Low gate charge (typical 29 nC)
- Low Crss (typical 20 pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



Absolute Maximum Ratings

T_C = 25°C unless otherwise noted

Symbol	Parameter		IRF634B	IRFS634B	Units
V_{DSS}	Drain-Source Voltage		250		V
I_D	Drain Current - Continuous (T_C = 25°C)		8.1	8.1 *	A
	- Continuous (T_C = 100°C)		5.1	5.1 *	A
I_{DM}	Drain Current - Pulsed	(Note 1)	32.4	32.4 *	A
V_{GSS}	Gate-Source Voltage		± 30		V
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	200		mJ
I_{AR}	Avalanche Current	(Note 1)	8.1		A
E_{AR}	Repetitive Avalanche Energy	(Note 1)	7.4		mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	5.5		V/ns
P_D	Power Dissipation (T_C = 25°C)		74	38	W
	- Derate above 25°C		0.59	0.3	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150		°C
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		300		°C

* Drain current limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	IRF634B	IRFS634B	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case Max.	1.69	3.29	°C/W
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink Typ.	0.5	--	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient Max.	62.5	62.5	°C/W

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Electrical Characteristics

T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 µA	250	--	--	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250 µA, Referenced to 25°C	--	0.27	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 250 V, V_{GS} = 0 V	--	--	10	µA
		V_{DS} = 200 V, T_C = 125°C	--	--	100	µA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 µA	2.0	--	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 4.05 A	--	0.345	0.45	Ω
g_{FS}	Forward Transconductance	V_{DS} = 40 V, I_D = 4.05 A (Note 4)	--	7.6	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	780	1000	pF
C_{oss}	Output Capacitance		--	95	125	pF
C_{rss}	Reverse Transfer Capacitance		--	20	25	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 125 V, I_D = 8.1 A, R_G = 25 Ω (Note 4, 5)	--	15	40	ns
t_r	Turn-On Rise Time		--	75	160	ns
$t_{d(off)}$	Turn-Off Delay Time		--	100	210	ns
t_f	Turn-Off Fall Time		--	65	140	ns
Q_g	Total Gate Charge	V_{DS} = 200 V, I_D = 8.1 A, V_{GS} = 10 V (Note 4, 5)	--	29	38	nC
Q_{gs}	Gate-Source Charge		--	4.2	--	nC
Q_{gd}	Gate-Drain Charge		--	14	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	8.1	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	32.4	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 8.1 A	--	--	1.5	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = 8.1 A, dI_F / dt = 100 A/µs (Note 4)	--	170	--	ns
Q_{rr}	Reverse Recovery Charge		--	0.91	--	µC

Notes:
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 4.9mH, I_{AS} = 8.1A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C
3. I_{SD} ≤ 8.1A, di/dt ≤ 300A/µs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Pulse Test : Pulse width ≤ 300µs, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

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Typical Characteristics

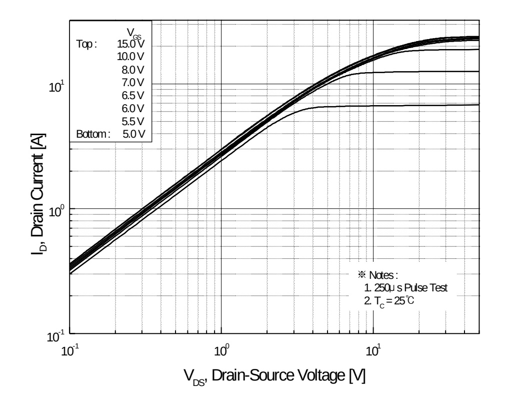


Figure 1. On-Region Characteristics

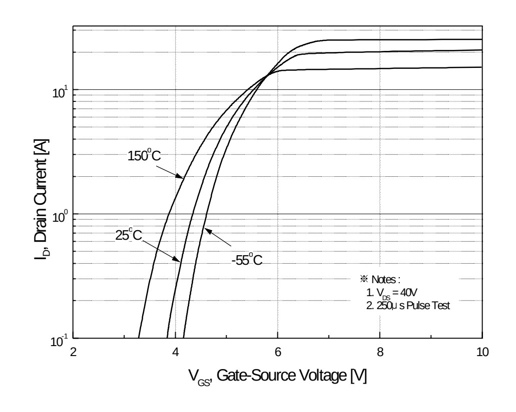


Figure 2. Transfer Characteristics

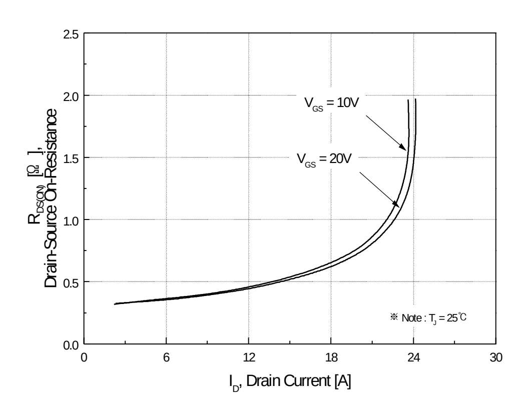


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

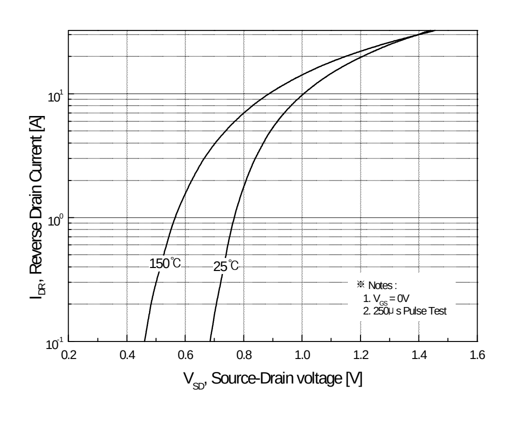


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

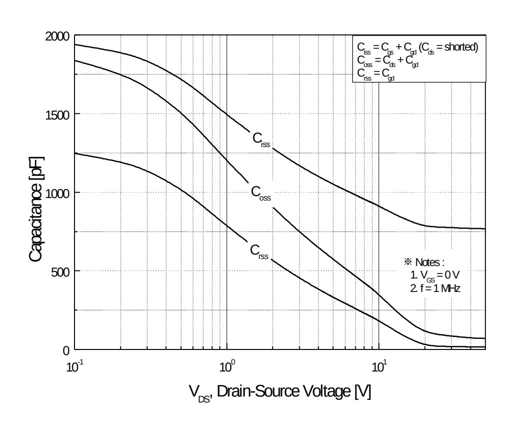


Figure 5. Capacitance Characteristics

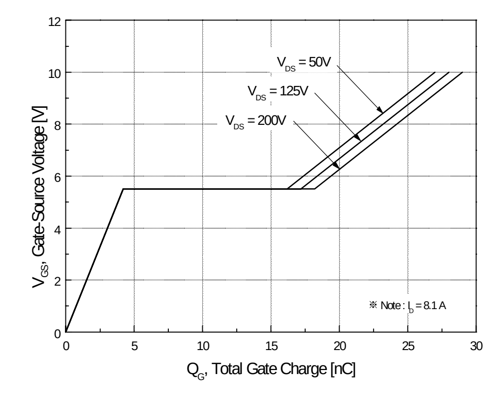


Figure 6. Gate Charge Characteristics

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Typical Characteristics (Continued)

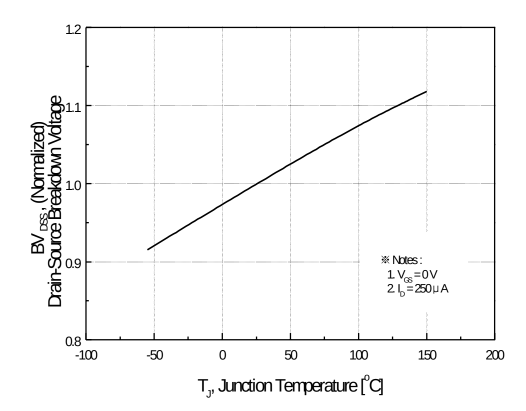


Figure 7. Breakdown Voltage Variation vs Temperature

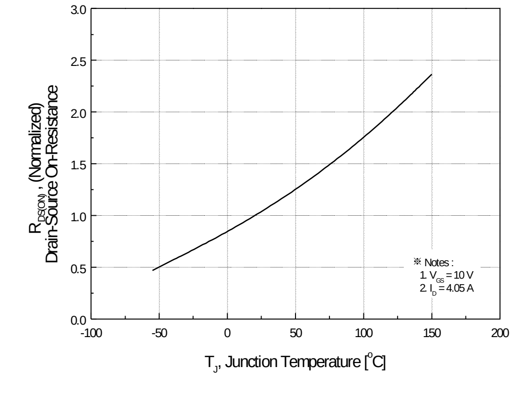


Figure 8. On-Resistance Variation vs Temperature

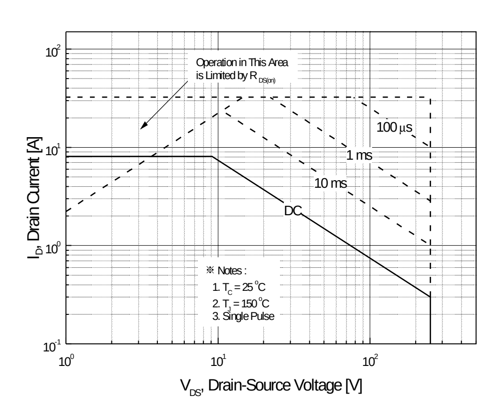


Figure 9-1. Maximum Safe Operating Area for IRF634B

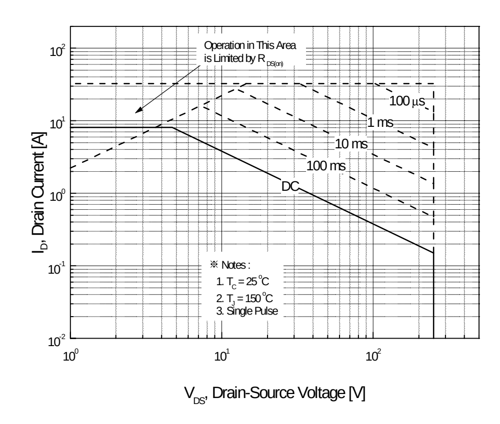


Figure 9-2. Maximum Safe Operating Area for IRFS634B

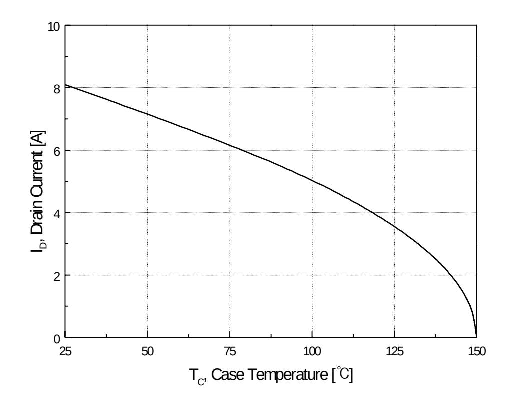


Figure 10. Maximum Drain Current vs Case Temperature

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Typical Characteristics (Continued)

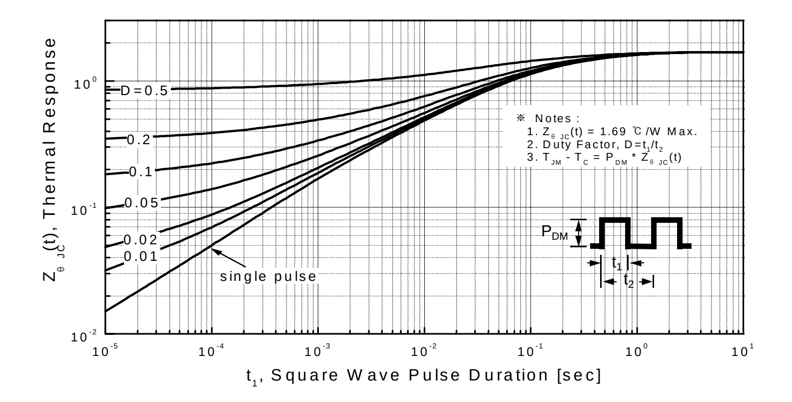


Figure 11-1. Transient Thermal Response Curve for IRF634B

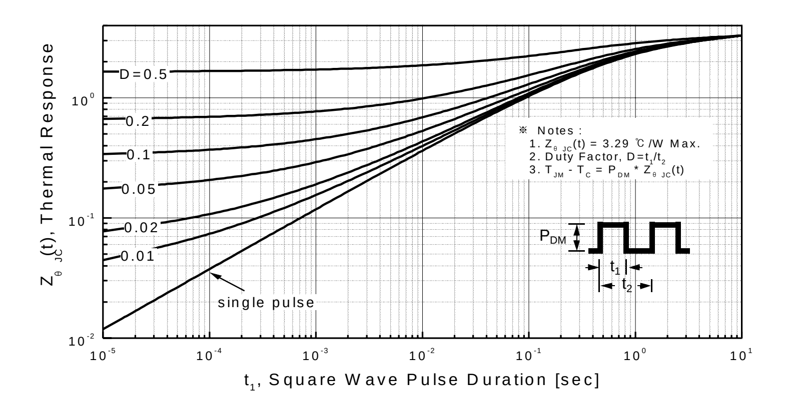
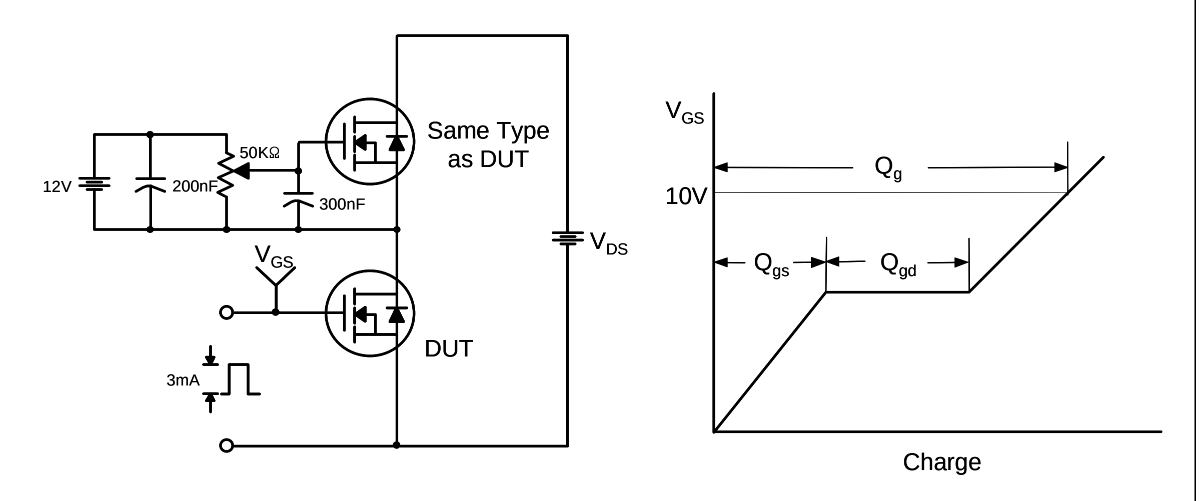
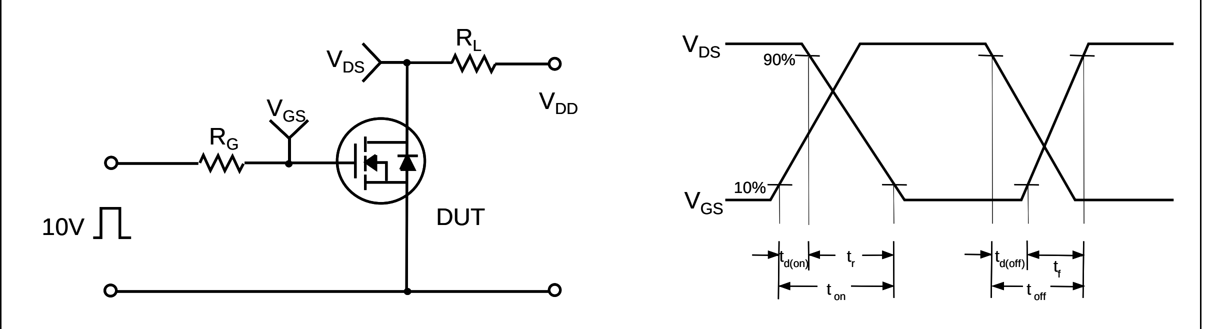


Figure 11-2. Transient Thermal Response Curve for IRFS634B

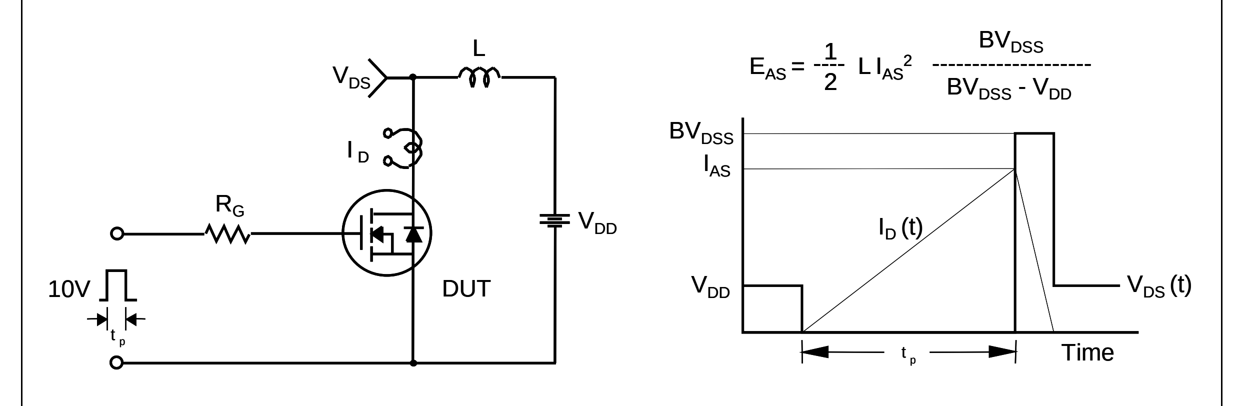
Gate Charge Test Circuit & Waveform



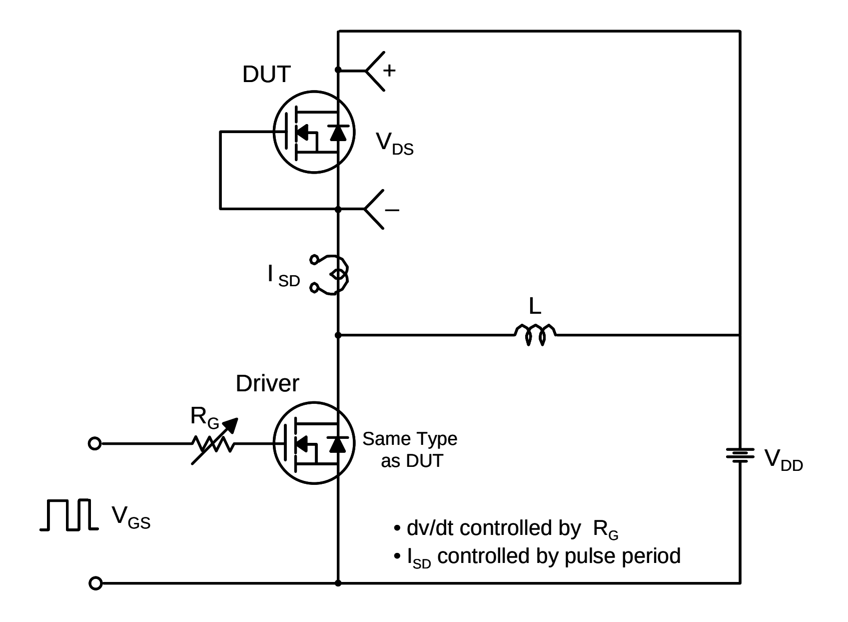
Resistive Switching Test Circuit & Waveforms

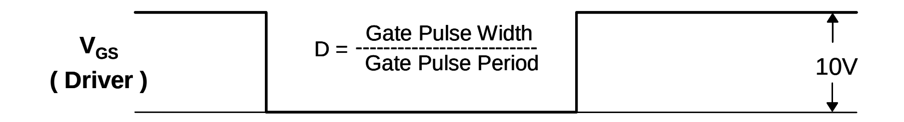


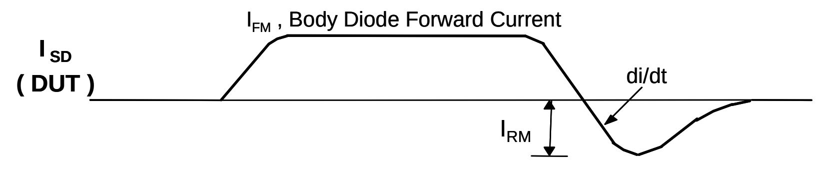
Unclamped Inductive Switching Test Circuit & Waveforms

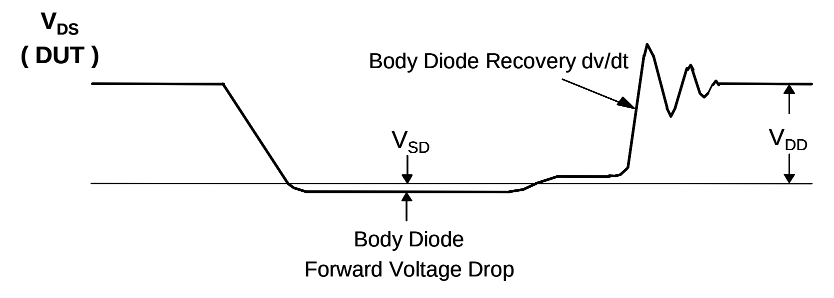


Peak Diode Recovery dv/dt Test Circuit & Waveforms

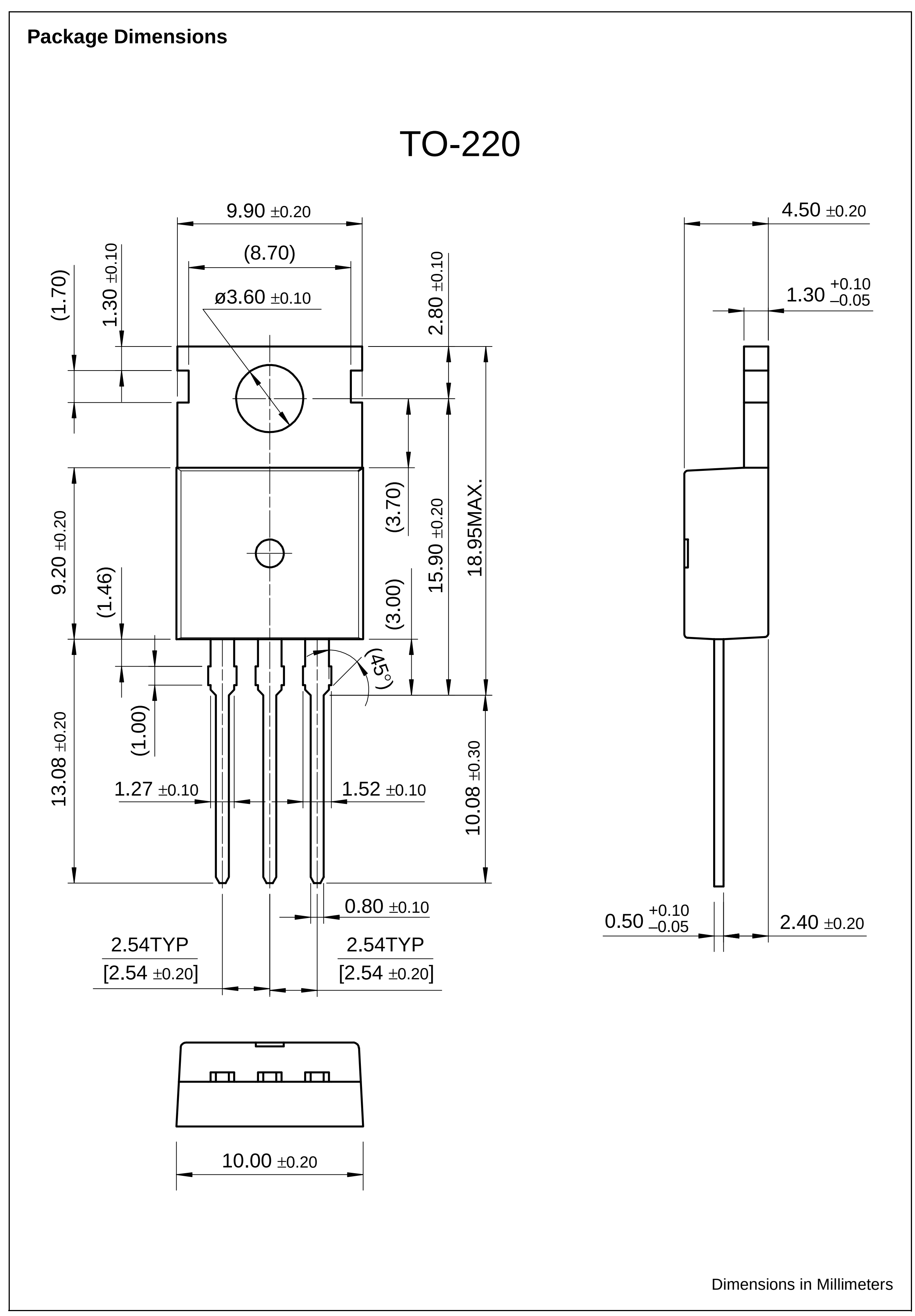






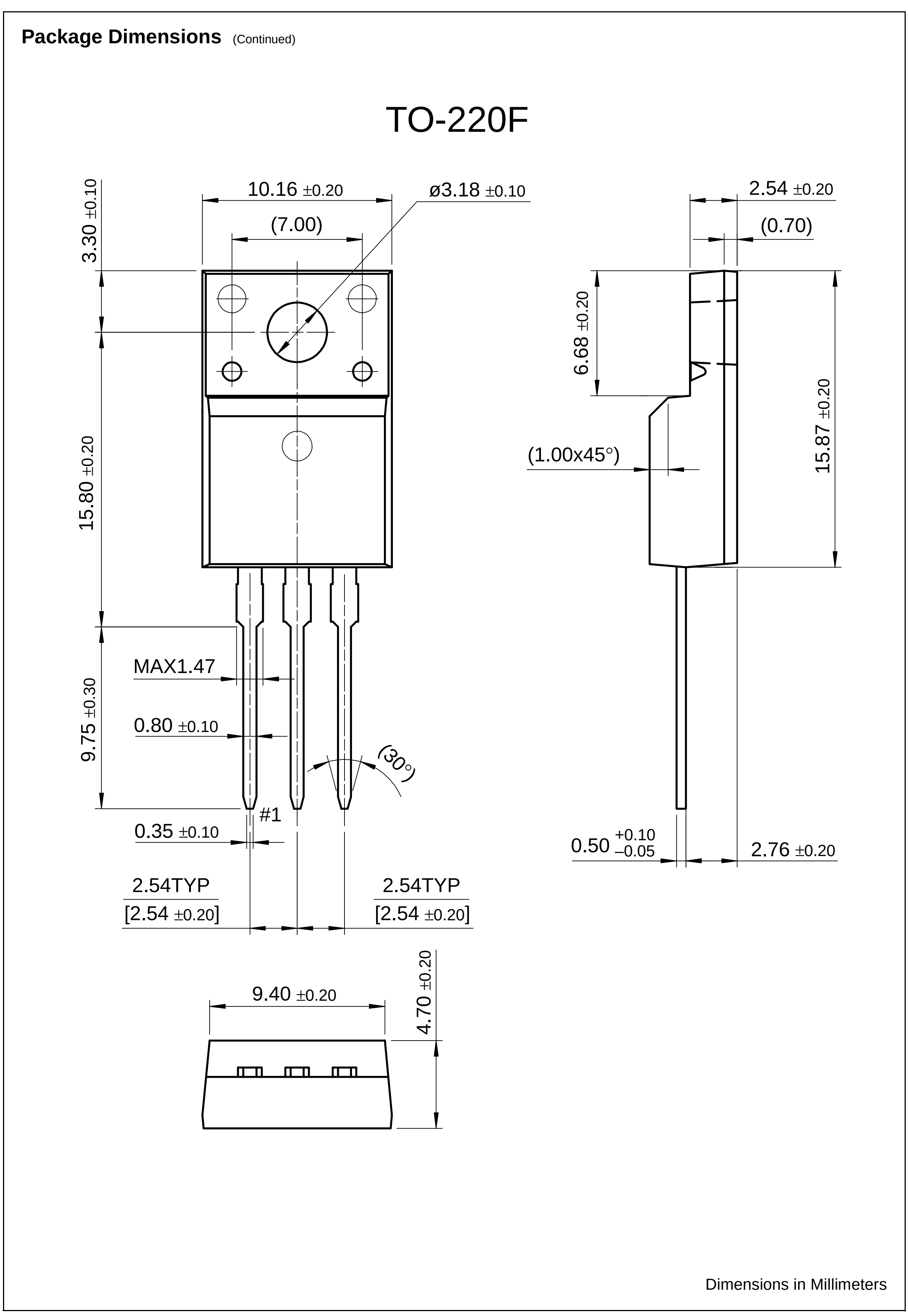


Package Dimensions



Dimensions in Millimeters

Package Dimensions (Continued)



Dimensions in Millimeters

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